

Complete Summary

GUIDELINE TITLE

Guidelines for the field management of combat-related head trauma. Treatment: pain management and the use of analgesics for sedation.

BIBLIOGRAPHIC SOURCE(S)

Knuth T, Letarte PB, Ling G, Moores LE, Rhee P, Tauber D, Trask A. Guidelines for the field management of combat-related head trauma. Treatment: pain management and the use of analgesics for sedation. New York (NY): Brain Trauma Foundation; 2005. 8 p. [23 references]

GUIDELINE STATUS

This is the current release of the guideline.

COMPLETE SUMMARY CONTENT

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SCOPE

DISEASE/CONDITION(S)

Pain and anxiety associated with combat-related traumatic brain injury

GUIDELINE CATEGORY

Evaluation
 Management
 Treatment

CLINICAL SPECIALTY

Emergency Medicine
Neurological Surgery
Neurology

INTENDED USERS

Emergency Medical Technicians/Paramedics
Physicians

GUIDELINE OBJECTIVE(S)

- To provide dispassionate analysis of the known benefits and risks of therapies available to the brain injured patient in the field
- To be a resource and a tool for the combat medic, physician, commanding officer, and logistician who must then make the tough "on the ground" therapeutic, tactical, and logistical decisions that will ultimately result in optimum care for the injured combatant
- To ease immediate suffering of patients with traumatic brain injury with analgesia and sedation treatment
- To control the pain-fear cycle to optimize return to full potential function

TARGET POPULATION

Combat personnel who sustain traumatic brain injury in the field

INTERVENTIONS AND PRACTICES CONSIDERED

1. Analgesic medication as part of a sedative regimen
2. Withholding of analgesics for patients with traumatic brain injury patients who cannot self-score pain
3. Monitoring of blood pressure, oxygenation, and ventilation

MAJOR OUTCOMES CONSIDERED

- Changes in blood and brain oxygenation
- Effects on intracranial pressure (ICP) and cerebral perfusion pressure (CPP)
- Length of pain reduction
- Frequency of side effects

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

General Search Strategy

In order to create an evidence-based document relevant to the field treatment of brain injury, the literature was searched for each topic for publications on brain injury that pertained to the prehospital or austere environment. From the comprehensive literature searches, articles were selected which were relevant to the field management of traumatic brain injury (TBI) and utilized human data. Articles with outcomes related to morbidity and mortality were preferred. In establishing a literature base for recommendations, the guideline authors generally only include publications that involve human subjects. However, in these Guidelines, they have included some publications that involve training with mannequins given that such training is an accepted practice in assessing competency for emergency medical technician (EMT) certification. Additional studies were, in general, referenced only as a part of background discussion. The prehospital literature was heavily utilized; military literature was used where it was available.

Specific Strategy for This Topic

An MEDLINE search of the literature from 1996 to April 2005 was conducted using the terms "pain" or "analgesics" or "opioid" (yield 35872 articles), "prehospital" or "EMS" (yield 3698 articles), and "brain injuries" or "head (craniocerebral) trauma" (yield 12089 articles). Combined searches including "pain and prehospital" yielded 57 articles and "pain and brain injury" yielded 150 articles. The combination of "brain injury" and "pain" and "prehospital" yielded no articles.

NUMBER OF SOURCE DOCUMENTS

7

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Classification of Evidence

Class I: Evidence from good quality, randomized, controlled clinical trials (RCT)

Class II: Evidence from moderate or poor quality RCT, good quality cohort, or good quality case-control studies

Class III: Evidence from moderate or poor quality cohort; moderate or poor quality case control; or case series, databases, or registries

Additional detail on quality criteria for each category is available in the original guideline document.

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

The Guidelines follow the recommendations of the Institute of Medicine (IOM) Committee to Advise the Public Health Service on Clinical Practice Guidelines outlined below:

1. There should be a link between the available evidence and the recommendations.
2. Empirical evidence should take precedence over expert judgment in the development of guidelines.
3. The available scientific literature should be searched using appropriate and comprehensive search terminology.
4. A thorough review of the scientific literature should precede guideline development.
5. The evidence should be evaluated and weighted, depending on the scientific validity of the methodology used to generate the evidence.
6. The strength of the evidence should be reflected in the strength of the recommendations, reflecting scientific certainty (or lack thereof).
7. Expert judgment should be used to evaluate the quality of the literature and to formulate guidelines when the evidence is weak or nonexistent.
8. Guideline development should be a multidisciplinary process, involving key groups affected by the recommendations.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

The authors of these guidelines, entitled *Guidelines for the Field Management of Combat-Related Head Trauma*, represented a multidisciplinary group consisting of neurosurgeons, trauma surgeons, neurointensivists, and paramedics from both the civilian and the military sectors. They were selected for their expertise in traumatic brain injury (TBI), combat medicine, or military medical education. All the military authors had recent combat experience. Each author independently conducted a MEDLINE or comparable search, reviewed and evaluated the literature for their assigned topics, then cooperated in formulating the Guidelines during several work sessions aimed at completing understandable and applicable recommendations based on the best evidence available. The template for these Guidelines was the first edition of the *Guidelines for Prehospital Management of Traumatic Brain Injury* developed by Brain Trauma Foundation (BTF) in 1999–2000.

Section I of each chapter in the original guideline document describes the conclusions the authors formulated from the literature. For the chapters on assessment, which included prognosis studies, the authors summarized the evidence rather than made recommendations. Thus, their findings are listed as "Conclusions" for any diagnostic or prognostic assessment and as "Recommendations" where the end result is a specific treatment or set of treatment options. Section VII in each chapter provides a brief analysis of the

literature that supports the conclusions or recommendations, whereas Section VIII references a more extensive list of studies.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Degrees of Certainty

Standards: Reflect a *high degree of clinical certainty* as indicated by the scientific evidence available (supported by Class I evidence).

Guidelines: Reflect a *moderate degree of clinical certainty* as indicated by the scientific evidence available (supported by Class II evidence).

Options: Reflect *unclear clinical certainty* as indicated by the scientific evidence available (supported by Class III evidence).

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

At several points during the development process, a review team comprised of representatives of the armed services medical "school houses," military neurosurgery and trauma surgery, and military medic instruction evaluated the document, and their comments were delivered to the authors. Several draft documents were produced and evaluated before this document was finalized and published. (The names of the reviewers are listed at the front of the original guideline document.)

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

"Degrees of Certainty" (Standards, Guideline, Options) and "Classification of Evidence" (Class I to III) and the correlation between the two are defined at the end of the "Major Recommendations" field.

Recommendations

A. Standards

Class I data regarding management of pain in the prehospital setting is insufficient to support a standard of treatment.

B. Guidelines

Evidence regarding management of pain in the prehospital setting does not exist to support guidelines on this topic.

C. Options

1. There are valid reasons to sedate traumatic brain injury (TBI) patients (i.e. to reduce the risk of further harm to self or others and to facilitate evaluation or evacuation) and analgesic medications are a standard part of most sedative regimens. In this case, analgesic medications should be administered in small incremental doses and with appropriate physiologic monitoring of blood pressure, oxygenation (arterial partial oxygen pressure or arterial blood oxygen saturation [PaO₂ or SaO₂]), and ventilation (carbon dioxide partial pressure or end-tidal carbon dioxide [pCO₂ or EtCO₂]).
2. There is no scientific data or physiologic evidence to support a hypothesis that pain relief improves outcomes in TBI patients, but there is some evidence to support the possibility that the most commonly available analgesic medications (including opiates and Ketamine) increase intracranial pressure (ICP) and may thereby be harmful. Therefore, withholding analgesics from TBI patients who cannot self-score pain (Glasgow Coma Scale score [GCS] <13; see the National Guideline Clearinghouse [NGC] summary of the Brain Trauma Foundation [BTF] [Guidelines for the field management of combat-related head trauma. Assessment: Glasgow Coma Scale scoring and assessment of pupils](#)) for short periods in the prehospital phase, where monitoring is unavailable, is a reasonable option.

Summary

There may be valid reasons for wanting to control pain in the prehospital setting if it contributes to anxiety or to harmful activity but there is simply no evidence to indicate whether this is helpful or harmful in this setting. The Hippocratic Rule to "First Do No Harm" should therefore guide commonplace practice. Cautious discriminate use with as much physiologic monitoring as possible is advised.

Pain management for TBI patients in the prehospital setting should be guided by the following principles:

- a. In the case of a minor closed head injury (GCS 13–15), a subjective assessment scale should be used before administering any analgesic and again before each additional dose. The goal should be to reduce pain to a level so that the patient remains comfortable but is not obtunded by the medication.
- b. In addition to effective pain relief, the ideal analgesic must not alter vital signs, hide complications, or cause delay in therapeutic decision-making.
- c. Analgesics should always be administered in small incremental doses.
- d. Monitoring should not be limited to intermittent manual observation; the paramedic must be able to use, interpret, and act upon the data derived from patient assessment and monitoring technology to help ensure a positive outcome for the patient.

- e. Hypotension (systolic blood pressure [SBP] <90 mm Hg) must be avoided or corrected immediately by administering IV fluids. SBP should be monitored as frequently as possible or continuously. (See NGC summary of the BTF [Guidelines for the field management of combat-related head trauma. Treatment: fluid resuscitation](#)).
- f. Oxygen saturation should be monitored as frequently as possible or continuously. Hypoxemia (apnea, cyanosis, or oxygen saturation [SaO₂] <90%) must be avoided, if possible, or corrected immediately by administering supplemental oxygen. (See the NGC summary of the BTF [Guidelines for the field management of combat-related head trauma. Treatment: airway, ventilation, and oxygenation](#)).
- g. End-tidal carbon dioxide (EtCO₂) should be monitored as frequently as possible or continuously. Hypocapnea with hypercarbia (respiratory depression with rise in EtCO₂) causes cerebral vasodilatation and subsequent increased intracranial pressure that must be avoided, if possible, or corrected immediately by administering small incremental doses of Narcan or by assisting ventilation with a bag-valve-mask device or by intubating and placing the patient on a ventilator. (See the NGC summary of the BTF [Guidelines for the field management of combat-related head trauma. Treatment: airway, ventilation, and oxygenation](#)).

Definitions:

Classes of Evidence

Class I: Evidence from good quality randomized controlled trials (RCT)

Class II: Evidence from moderate or poor quality RCT, good quality cohort, or good quality case-control studies

Class III: Evidence from moderate or poor quality cohort; or moderate or poor quality case-control; or case series, databases, or registries

Degrees of Certainty

Standards: Reflect a *high degree of clinical certainty* as indicated by the scientific evidence available (supported by Class I evidence).

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Options: Reflect *unclear clinical certainty* as indicated by the scientific evidence available (supported by Class III evidence).

CLINICAL ALGORITHM(S)

A clinical algorithm for "Field Management of Combat-Related Head Trauma" is provided in the original guideline document.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

An evidentiary table appears at the end of each major section of the guideline document, which classifies each citation based on the quality of the evidence (Class I-III; see "Major Recommendations" for definitions). The recommendations in this summary are supported by six Class III studies and one Class II study.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate use of analgesics for sedation in combat-related traumatic brain injury

POTENTIAL HARMS

- Opioids may cause an increase in intracranial pressure (ICP).
- Many of the opioids may cause nausea, vomiting, vagal or anaphylactic reactions, and have significant detrimental hemodynamic and respiratory side-effects in situations where standard monitoring equipment is limited or not available.
- In comparison with equianalgesic doses of opioids, Tramadol rarely causes respiratory depression and cardiovascular side effects are minor as are episodes of dizziness, nausea, sedation, dry mouth, and sweating.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- The information contained in the *Guidelines for the Field Management of Combat-Related Head Trauma*, which reflects the current state of knowledge at the time of completion (November 2005), is intended to provide accurate and authoritative information about the subject matter covered. Because there will be future developments in scientific information and technology, it is anticipated that there will be periodic review and updating of these Guidelines. These Guidelines are distributed with the understanding that the Brain Trauma Foundation is not engaged in rendering professional medical services. If medical advice or assistance is required, the services of a competent physician should be sought. The recommendations contained in these Guidelines may not be appropriate for use in all circumstances. The decision to adopt a particular recommendation contained in these Guidelines must be based on the judgment of medical personnel, who take into consideration the facts and circumstances in each case and on the available resources.
- The majority of available recommendations are extrapolated from civilian data. In some instances, it will be obvious that the best civilian data have direct application to military scenarios. In others, it will be equally obvious that the best available civilian recommendation is impractical at best, and

potentially threatening to life or mission accomplishment at worst. The guideline authors have attempted to discriminate between the two as often as possible, based on the available military-specific literature and personal experience. Ultimately, it will be the decision of the individual medic and/or the unit chain of command as to whether a particular diagnostic or therapeutic maneuver can be implemented. The general direction the authors have taken with their recommendations is that the best-known community standard should be implemented whenever possible.

- The recommendations in these guidelines are based on the best available data, and the authors maintained a patient-driven focus during development. In other words, each recommendation was created based upon the best care possible for the patient, in spite of the fact that tactical limitations may prevent this level of care from actually being available to all patients at all times. It should also be noted that guidelines such as these are quite different than protocols developed by medical facilities or military units. Protocols should be generated locally to give very specific directions as to how individual providers are to act in a variety of situations. Guidelines such as these are intended to serve as a starting point for the development of facility-specific protocols.
- Factors that create limitations in the level of medical care available in the combat environment include the overall tactical scenario, physiologic parameters associated with combat, and logistics. The guideline authors' ability to develop standards for optimal management is limited by a lack of scientific data. The majority of the recommendations provided are extrapolated from civilian data. While many of these recommendations will be both practical and applicable, the ability of the individual medic to provide this care may be limited.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Clinical Algorithm

For information about [availability](#), see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Knuth T, Letarte PB, Ling G, Moores LE, Rhee P, Tauber D, Trask A. Guidelines for the field management of combat-related head trauma. Treatment: pain management and the use of analgesics for sedation. New York (NY): Brain Trauma Foundation; 2005. 8 p. [23 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2005

GUIDELINE DEVELOPER(S)

Brain Trauma Foundation - Disease Specific Society

SOURCE(S) OF FUNDING

Brain Trauma Foundation

Uniformed Services University of the Health Sciences

GUIDELINE COMMITTEE

Not stated

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the [Brain Trauma Foundation Web site](#).

Print copies: Available from the Brain Trauma Foundation, 708 Third Avenue, New York, NY 10017

AVAILABILITY OF COMPANION DOCUMENTS

None available

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI Institute on August 24, 2007. The information was verified by the guideline developer on January 28, 2008.

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Date Modified: 10/6/2008

